FACULTY OF ENGINEERING
B. E. 3/4 (Civil) II – Semester (Backlog) Examination, October 2020

Subject: Soil Mechanics

Time: 2 hours   Max. Marks: 75

PART – A

Note: Answer any seven questions. (7x3 = 21 Marks)

1. The results of sieve analysis on three soil samples are given below. Say which soil is gap graded and Justify your answer.

Sieve Size, mm	Soil A	Soil B	Soil C
4.75	100	99	98
2.0	59	62	55
0.425	28	32	55
0.075	1	0	2

2. What is the influence of temperature on the coefficient of permeability of soils?
3. Flow net is drawn from a weir. The total loss of head is 5m, the number of potential drops is 10 and the length of the flow line for the last square is 1m. Calculate the exit gradient.
4. Derive the expression for capillary rise in a tube inserted in water.
5. A consolidating stratum takes two years of 50% consolidation. Find the time taken by the stratum for 90% consolidation for the same drainage condition?
6. The primary consolidation settlement of a 6m thick clay layer with single drainage is estimated as 108 cm. Later it was found that the medium has double drainage, Then all other parameters remaining the same, What will be the primary consolidation settlement?
7. List various field compaction methods along with their suitability.
8. Draw the strength envelopes for fully saturated clay subjected to CD test and fully saturated sand subjected to UU test.
9. Find the factor of safety of an infinite slope having a slope angle of 28˚. The slope consists of cohesionless soils with an angle of internal friction of 33˚.
10. What is the maximum depth to which a trench of vertical sides can be excavated in a clay stratum with c=50kN/m^2 and γ = 16 kN/m^3.

PART – B

Note: Answer any three questions. (3x18 = 54 Marks)

11. (a) Explain IS soil classification system for classifying coarse grained soil.
(b) Briefly discuss the various types of triaxial shear test based on drainage condition. The liquid limit, plastic limit and shrinkage limit of a soil are 60%, 40%, 30% respectively. A specimen of the soil has a volume of 100cm3 at liquid limit. Find its volume at shrinkage limit, if the specific gravity of solids 2.0. When an oven dried sample of the soil is subjected to liquid limit test, reduces to 42%. Classify the soil as per IS, if the fraction of the soil passing 75 micron sieve is 70%.

12. (a) List various laboratory tests for determination of coefficient of permeability and explain any one method in detail.
(b) An unconfined aquifer is known to be 32m thick below the water table. A constant discharge of 2 cubic meters is pumped out of the aquifer through a tube well till the water level in the tube well becomes steady. Two observation wells at distances of 15m and 70m from the tube well show falls of 3m and 0.7m respectively from their static water levels. Find the permeability of the aquifer.

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13. (a) Listing the various factors that influence the compaction of soils. Show their influence with illustrative sketches of compaction curves.

(b) A loose uncompacted sand fill 1.5m deep has a relative density of 30%. Laboratory tests on the same sand indicate that minimum and maximum void ratios are 0.45 and 0.82 respectively. The specific gravity of solids is 2.65. If the sand fill is compacted to a relative density of 70%, What is the decrease in its thickness? Also find the dry unit weight of the compacted sand.

14. (a) Derive the equation for terzaghi's theory of one dimensional consolidation with a neat sketch?

(b) A clay layer of 8m thick with single drainage settles by 120 mm in 2 years. The coefficient of consolidation for this clay was found to be $6 \times 10^{(-3)}$ cm^2/s. Calculate the likely ultimate consolidation settlement and find out how long will it take to undergo 90% of this ultimate settlement?

15. (a) Direct shear test was conducted on compacted sand shear box dimensions 60mmx60mm. The readings are listed below.

Normal Load (N)	Peak Shear Load (N)	Ultimate Shear Load (N)
110	95	65
225	195	135
340	294	200

Determine the angle of shearing resistance
(i) In the dense compacted state
(ii) In a Loose state.

(b) Sketch and discuss the stress – strain and volume change relationship for dense and loose sand.

16. (a) What do you understand by the 'static general plastic equilibrium'? Explain the concept of active and passive earth pressures with the help of Mohr circle and shear strength envelope?

(b) A gravity retaining wall retains 12m of a backfill, γ=17.7 kN/m^3, and ϕ=25°with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active pressure. If the water table is at a height of 6m, how far do the magnitude and the point of application of active pressure will change.

17. (a) Discuss the stability analyses of slopes of Fellenius Method?

(b) A 45° slope has been excavated to a depth of 8m in a saturated clay which has following properties. C_u = 60kN/m^2, ϕ = 0; and γ= 20kN/m^2. Determine the Factor of safety for the trial failure surface whose radius is 12m and arc length is 18.84 m. the area of the trial wedge is 70 m^2 and centre of gravity of the trail wedge is 4.5 m away from the centre of the failure surface.

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FACULTY OF ENGINEERING
BE 3/4 (EEE) II Semester (Backlog) Examination, October 2020

Subject: Digital Signal Processing

Time: 2 Hours   Max.Marks:75

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1 Define static and dynamic systems?
2 Derive the expression for condition for stability?
3 Distinguish between linear convolution and circular convolution.
4 What is meant by zero padding?
5 Find the Z-Transform of the sequence $x(n)=n^2u(n)$
6 Find the system function and the impulse response of the system described by difference equation $y(n)=x(n)+2x(n-1)-4x(n-2)+x(n-3)$
7 Write short notes on Impulse Invariant transformation?
8 Compare Butterworth and Chebyshev Type-I filters
9 Compare various window techniques?
10 Mention the need for employing window technique in FIR filter design.

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11 a) Determine whether the systems described by difference equations
    below are causal or non-causal?
       i) $y(n) = x(n)+x^2(n-1)$
       ii) $y(n) = x(2n)$
       ii) $y(n) = x(n+1)+3 x(n)+5 x(n-1)$

   b) Determine whether the systems described by difference equations
    below are Time Invariant or Time variant ?
       i) $y(n) = x(-n)$
       ii) $y(n) = x(n) + nx (n+1)$

   c) Determine whether the systems described by difference equations
    below are Static or dynamic?
       i) $y(n) = x(n) x(n-1)$
       ii) $y(n) = x^2(n) + x(n)$

   d) Determine whether the systems described by difference equations
    below are Stable or unstable ?
       i) $y(n) = x(n) u(n)$
       ii) $y(n) = ax(n)+b$

12 i) Compute DFT of the sequence
        $x(n) = \{1,1,1,1,0,0,0,0 \}$
    ii) Perform the circular convolution on the following sequences
      using graphical method
        $x_1(n) = \{2,1,2,1\}$
        $x_2(n) = \{1,2,1,2\}$

13 Find X(K),for the sequence x(n)= {1,0,1,1,1,0,1,0 } using the Decimation-in- Time (DIT) FFT Algorithm.

14 a) Determine the causal signal x(n) having Z-Transform

$$X(Z) = \frac{1}{(1-2z^{-1})(1-z^{-1})^2}$$

b) Realise the following system function using minimum number of multipliers

$$H(Z) = 1 - \frac{1}{3}z^{-1} + \frac{1}{4}z^{-2} + \frac{1}{4}z^{-3} + \frac{1}{3}z^{-4} + z^{-5}$$

15 Design a Chebyshev filter for the following specifications using impulse invariance technique

$$0.8 \le \left| H(e^{j\omega}) \right| \le 1 \quad \text{for} \quad 0 \le \omega \le 0.2\pi$$
$$\left| H(e^{j\omega}) \right| \le 0.2 \text{ for } 0.6\pi \le \omega \le \pi$$

16 Design an FIR low pass filter satisfying the following specifications

$\alpha_p \le 0.1$ dB $\alpha_s > 44.0$ dB $\omega_{sf} = 100$ rad/sec

$\omega_p = 20$ rad/sec $\omega_s = 30$ rad/sec

17 i) Draw the architecture of TMS 320C54X DSP Processor
   ii) Mention the applications of DSP

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FACULTY OF ENGINEERING

B.E. (3/4) (Inst.) II – Semester (Backlog) Examination, October 2020

Subject: Digital Signal Processing

Time: 2 hours   Max. Marks: 75

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1. Find the z-transform with ROC for the signal $x(n) = 1/3)^n\ u(n)$.

2. Determine the following signal is energy or power signal.

   $x(n) = 1/5)^n\ .u(n)$.

3. Write the two properties of twiddle factor $W_N = e^{-j2\pi/N}$ in FFT.

4. State and prove Time shifting property of DFT.

5. Explain the difference between Butterworth and Chebyshev filters.

6. Explain Bilinear Transformation.

7. Write the necessary and sufficient condition for FIR filter to have Linear Phase

8. Write the design techniques of Linear Phase FIR filter using Windows.

9. Write some real world applications of Digital signal Processor.

10. What is pipelining in digital signal processor?

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11. (a) Find the inverse Z-transform of

$$X(z) = \frac{(1/4)z}{(z - 1/2)(z - 1/4)}; \text{ for } \backslash z \backslash > \frac{1}{2}$$

   (b) Find the Linearity and Time Invariance of the following system.

   $Y(n) = nx(n)+x(n+2)+y(n-2)$

12. Obtain 8-point DFT of the following signal using DIF FFT algorithm.

   $X(n)=\{2,2,2,2,1,1,1,1\}$

13. (a) For the analog transfer function $H_a(s) = \dfrac{6}{(s + 2)(s + 3)}$

   Determine *H(z)* if T=0.5 sec using Impulse Invariant Transformation.

   (b) Find the order of the Butterworth IIR filter for the following specifications with
   T=1 sec and Impulse invariant transformation to be used.

$$\sqrt{0.5} \leq |\ H(\omega)\ |\ 1; 0 \leq \omega \leq -\frac{\pi}{2}$$

$$|\ H(\omega)\ | \leq 0.2: \frac{3\pi}{4} \leq \omega \leq \pi$$

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14. Design a High-pass digital FIR filter using Hamming Window, with a cut-off frequency of 1.2ra/sec with N=9.

15. (a) Explain the Hardware FFT processors in detail.

   (b) Explain the Hardware digital filters in detail.

16. (a) Determine the response of the system using Linear convolution with

   $X(n) = \{1,2,0,1\}, h(n) = \{2,2,1,1\}$

   (b) Obtain the Direct Form-II structure from the following transfer function.

   $$H(z) = \frac{1 + 4z^{-1} + 3z^{-2}}{1 + (13/12)z^{-1} + (9/24)z^{-2} + (1/24)z^{-3}}$$

17. (a) Find the 4-point DFT of signal $x(n) = \{1,-2,3,2\}$

   (b) Explain Sampling Theorem and reconstruction of Signal.

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FACULTY OF ENGINEERING
B.E. 3/4 (Inst.) II-Semester (Old) Examination, October 2020

Subject : Digital Signal Processing & Applications

Time: 2 Hours   **Max. Marks: 75**

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1. Determine the system function of the following difference equation.
$$y(n) - \frac{1}{3}y(n-1) + \frac{2}{7}y(n-2) = x(n) - \frac{3}{7}x(n-1)$$
2. What are Sampling, Quantizing and Signal Reconstruction?
3. Find the DTFT of the following signal x(n)={2,0,3,0}.
4. List the properties of DFT.
5. What is warping effect and how it can be overcome?
6. If H(s) =1/S(S + 1), find H (z) using impulse invariant method.
7. Compare FIR and IIR filters.
8. Write the expression of Bartlet window function.
9. Explain the process of Pipelining in Digital Signal Processor.
10. List the applications of Digital Signal Processor.

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11. (a) Determine whether the following systems are Linear, Time Invariant and Causal
    (i) y(n)=x(n)+2x(n-1)+3x(n+1)   (ii) y(n)=cos(x(n))
    (b) Determine the output response y(n) if input is x(n)={2,-1,3,5} and impulse response of h(n)={1,1,1,1} by using
    (i) Linear Convolution (ii) Circular Convolution

12. Find 8-point DFT of the sequence x(n)={1,3,4,-1,4,6,7,2} by Radix-2 DIF FFT.

13. Design a Butterworth digital IIR Lowpass filter using Impulse Invariance method to satisfy the following conditions.
$0.8 \le | H (\omega) | \le 1$ for $0 \le \omega \le 0.2\pi$,
$| H (\omega) | \le 0.2$ for $0.6 \pi \le \omega \le \pi$.

14. Design a linear FIR Lowpass filter using rectangular window by taking 7 samples of window sequence and with Cutoff frequency of ω_c=0.2π rad/sec.

15. Explain the architecture of TMS320C3X floating point Digital Signal Processor with neat diagram.

16. (a) Compare General purpose and Special purpose Digital Signal Processor.
    (b) Casual LTI system is represented by difference equation
        y(n) – 0.7y(n-1) + 0.12y(n-2) = x(n-1) + x(n-2)
    Determine impulse response of the system using DTFT

17. Obtain Direct form I and Direct form II structures of the given system.
$$H (z) = \frac{(1 + z^{-1}) (1 + 3z^{-1})}{(1 + 0.5z^{-1}) (1 - 0.25 z^{-1}) (1 + 0.125 z^{-1})}$$

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FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II - Semester (Backlog) Examination, October 2020

Subject : Digital Communication

Time : 2 hours **Max. Marks : 75**

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 Represent the given data in unipolar RZ and polar RZ format.
   Data 11010011
2 With help of neat diagram write about significance of eye pattern.
3 Write the properties of information.
4 Define discrete memoryless channel.
5 Define the terms   a) Codeword   b) block length   c) minimum distance
6 What is syndrome?
7 Any three application of FHSS system.
8 Explain jamming margin.
9 What is pass band transmission?
10 Describe optimum receiver.

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 a) Explain the elements of digital communication system in detail.
   b) Describe various quantization techniques used in PCM.

12 a) State and prove the mutual information of channel is symmetric
          $I(X : Y) = I(Y : X)$
   b) Using Shannon Fano method find the efficiency of the source
       $P(x_1) = 0.4$; $P(x_2) = 0.2$; $P(x_3) = 0.12$; $P(x_4) = 0.08$; $P(x_5) = 0.08$;
       $P(x_6) = 0.04$; $P(x_7) = 0.08$

13 Find all code words using nonsystematic form of (7, 3) cyclic code generated by $G(P) = P^4 + P^3 + P^2 + 1$

14 a) With neat block diagram explain BPSK transmitter.
   b) Describe M-ary signaling.

15 a) Write various synchronization techniques in spread spectrum systems.
   b) Write the properties of PN sequence.

16 a) Design a syndrome calculator for (7, 4) cyclic hamming code generated by $G(P) = P^3 + P + 1$
       Calculate the syndrome for Y = (1001101).
   b) Write the differences between linear block code and cyclic code.

17 Answer any two terms :
   a) Compounding in PCM system
   b) Coherent FSK demodulator
   c) BCH code
   d) Data acquisition of DSSS signal

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FACULTY OF ENGINEERING
BE 3/4 (M/P) II-Semester (Backlog) Examination, October 2020

Subject: Machine Design

Time: 2 Hours **Max. Marks: 75**

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 Explain the following terms in helical spring with suitable sketches
   i) Eccentric load   ii) Buckling load
2 What is the difference between helical gears and herringbone gears?
3 What are the types of sliding contact bearing?
4 How do you design the size of bolts for securing the big end cap of the
   connecting rod?
5 Which type of cross section is preferred for the crane hook and why it is
   preferred?
6 Explain briefly the construction of leaf spring with neat diagram.
7 What kind of contact occurred between worm and worm wheel? How does
   this differ from other gears?
8 Define the following terms of Journal bearing
   a) Bearing characteristic number   b) Bearing modulus
9 Explain briefly about flywheel in a punching press.
10 Mention the forces acting on the connecting rod.

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 A composite spring has two closed coil helical springs and the outer spring is
   18 mm larger than the inner spring. The outer spring has 12 coils of mean diameter 50 mm and
   wire diameter 6mm. The inner spring has 10coils of mean diameter 35mm and wire diameter 4
   mm. When the spring is subjected to an axial load of 500 N, the modulus of rigidity may be
   taken as 80kN/mm^2. Determine
   1. Compression of each spring,
   2. Load shared by each spring, and 3. Shear stress induced in each spring.

12 The following specification of a spur gear are given :
   Pinion transmited by the pinion = 500kW
   Speed of the driving shaft = 1800r.p.m.
   Gear ratio = 10 : 1(Pinion should be smaller)
   Distance between driving and driven shafts = 660 mm approximately;
   Involute teeth of standard proportions (addendum = one module)
   Pressure angle of 22.5°
   Permissible normal pressure between teeth = 175 N per mm of width.
   Determine
   1. The nearest standard module if no interference is to occur
   2. The number of teeth on each wheel
   3. The necessary width of the pinion; and
   4. The load on the bearings of the wheels due to power transmitted.

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13 Design a journal bearing for the following data :
Load on the journal = 20 000 N, Speed of the journal = 900r.p.m.
Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.017 kg / m-s Ambient
temperature of oil = 15.5°C ;
Maximum bearing pressure for the pump = 1.5 N / mm^2.
Heat dissipation coefficient = 1232 W/m^2/°C
Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of
oil be limited to 10°C.

14 Design and draw a piston for a single acting four stroke engine for the following data:
Cylinder bore = 100 mm
Stroke = 125 mm
Maximum gas pressure = 5 N/mm^2
Indicated mean effective pressure = 0.75 N/mm^2
Mechanical efficiency = 80%
Fuel consumption = 0.15 kg per brake power per hour
Higher calorific value of fuel = 42 × 10^3 kJ/kg
Speed = 2000 r.p.m.
Any other data required for the design may be assumed.

15 Design a crane hook to carry a load of 150 kN.

16 Design a pair of helical gears for transmitting 22 kW. The speed of the driver gear is 1800
r.p.m. and that of driven gear is 600 r.p.m. The helix angle is 30° and profile is corresponding
to 20° full depth system. The driver gear has 24 teeth. Both the gears are made of cast steel
with allowable static stress as 50MPa. Assume the face width parallel to axis as 4 times the
circular pitch and the overhang for each gear as 150 mm. The allowable shear stress for the
shaft material may be taken as 50MPa. The form factor may be taken as, $\frac{0.154-0.912}{T_E}$ where T$_E$ is
the equivalent number of teeth. The velocity factor may be taken as, $\frac{350}{350+v}$ where v is pitch line
velocity in m /min. The gears are required to be designed only against bending failure of the
teeth under dynamic condition

17 Write short notes on
   i) stresses subjected in helical spring
   ii) form factor of helical gears
   iii) materials used in journal bearings
   iv) function of a flywheel
   v) design procedure for C-clamps of trapezoidal cross section

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FACULTY OF ENGINEERING
BE 3/4 (A.E.) II-Semester (Backlog) Examination, October 2020

Subject: Design of Automotive Components

Time : 2 Hours   Max. Marks: 75

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1 Why the area of the inlet valve port is made larger than the area of exhaust valve port in an IC engine?
2 What is the role of bearing pressure in design of crank shaft?
3 Briefly discuss the importance of A.M. Wahl's factor in the design of helical springs.
4 Differentiate between semi elliptical and elliptical leaf springs.
5 What is an antifriction bearing?
6 Differentiate hydro static and hydro dynamic lubrication.
7 Explain about positive drive.
8 Classify main four types of gears and discuss their applications.
9 What component of a differential assembly holds the ring gear, the spider gears, and the inner ends of the axles, explain?
10 How a differential drives the ring gear?

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11 Design an overhung crank shaft with two main bearings and a flywheel in between them for an IC Engine, single cylinder 0.25m x 0.3m. The flywheel weighs 27kN. The maximum pressure is 2.1MPa. The torsional moment is maximum when the crank is at 350 from the IDC, while the pressure is 1.05MPa. Assume missing data.

12 A helical compression spring is made of oil tempered carbon steel and is subjected to a load varying from 600 N to 1000 N. The spring index is 6 and the factor of safety is 1.5. If the yield stress and endurance stress of the material is 700 MPa, and 350 MPa respectively. Design the spring.

13 A truck spring has 12 number of leaves, two of which are full length leaves. The spring supports are 1.05m apart and the central band is 85 mm wide. The central load is to be 5.4 KN with a permissible stress of 280 MPa. Determine the thickness and width of the steel spring leaves. The ratio of the total depth to the spring is 9. Also determine the deflection of the spring.

14 A bearing 50 mm diameter and 75 mm in length supports an overhanging shaft running at 900 rpm. The room temperature is 30ºC and the oil film temperature is 75ºC. The viscosity of the oil used is 0.012 kg/m-s at the operating temperature of 120ºC. The diameter clearance is 0.05mm and the bearing is to operate in still air without any artificial cooling. Calculate the permissible load on the bearing and power loss in friction. The heat dissipation coefficient may be assumed as 300 W/m^2/ºC.

15 A ball bearing is operating on a work cycle consists of three parts as follows : A radial load of 3000N at 1440 rpm for one quarter cycle, a radial load of 5000N at 720 rpm for one half cycle and radial load of 2500n at 1440 rpm for the remaining cycle. The expected life of the bearing is 10000hrs. Calculate the dynamic load carrying capacity of the bearing.

16 A 15 kW and 1200 rpm motor drives a compressor at 300 rpm through a pair of spur gears having 20o stub teeth. The centre distance between the shafts is 400 mm. The motor pinion is made of forged steel having an allowable static stress as 210 MPa, while the gear is made of cast steel having allowable static stress as 140 MPa. Assuming that the drive operates 8 to 10 hours per day under light shock conditions, find from the standpoint of strength 1. Module ; 2. Face width and 3. Number of teeth and pitch circle diameter of each gear.

17 A worm drive transmit 15 kW at 2000 rpm to a machine carriage at 75 rpm. The worm is triple threaded and has 65 mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to 20o full depth involute. The coefficient of friction between mating teeth may be taken as 0.010. Calculate : (i) Tangential force acting on the worm ; (ii) Axial thrust and separating force on worm ; and (iii) Efficiency of the worm drive.

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FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II-Semester (Backlog) Examination, October 2020

Subject : Computer Networks

Time : 2 hours   **Max. Marks : 75**

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1   List and explain the design issues of Network Layer.
2   Discuss about the need of NAT with neat diagram.
3   What is silly window syndrome?
4   Give the format of DNS resource record.
5   What are the reserved ports? Give Suitable examples.
6   Illustrate count-to-infinity problem using an example.
7   State General Principles of Congestion Control.
8   Can a machine with single DNS name have multiple IP addresses if
     so how could this occur.
9   Is FTP a TCP or UDP. Justify your answer.
10 Discuss briefly about out-of-band data.

PART – B

 Note: Answer any three questions.   **(3x18 = 54 Marks)**

11 a) Illustrate Link state routing algorithm with an example?
    b) Explain briefly about any three Congestion Control algorithms
         for data gram subnets?
12 a) Explain Header format of IPV4 with a neat diagram?

    b) Explain OSPF with an suitable example.
13 a) Illustrate crash recovery scenario in TCP Protocols.
    b) Explain timer management in internet Transport protocol.
14 a) What is the purpose of SNMP? Discuss about SNMP basic components
         and their functionalities.
    b) Explain about VOIP.
15 a) Illustrate about the steps performed by the internet super server.
    b) List and explain any two advanced socket system calls.
16 a) Explain reverse path forwarding broadcast routing algorithm with an example.
    b) Explain any three Congestion control algorithms for datagram subnets?
17   Write notes on any two.
    a) SMTP
    b) TCP connection establishment
    c) Fragmentation

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FACULTY OF ENGINEERING

B.E 3/4 (IT) II-Semester (Backlog) Examinations, October 2020

SUBJECT: Computer Networks

Time: 2 Hours   Max Marks: 75

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1. List and explain the design issues of Network Layer.

2. Discuss about the need of NAT with the neat diagram.

3. What is silly window syndrome?

4. Differentiate between authentication and authorization.

5. What are reserved ports ? Give suitable examples

6. Illustrate count–to-infinity problem using an example.

7. State General Principles of Congestion Control.

8. What is the difference between private key and public key algorithms?

9. Define a Daemon process.

10. Discuss briefly about out-of-band data.

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11. a) Illustrate Link state routing algorithm with an example?
    b) Explain briefly about any three Congestion control algorithms for data gram
       subnets?

12. a) Explain Header format of IPV4 with a neat diagram?
    b) Explain OSPF with an suitable example.

13. a) Illustrate crash recovery scenario in TCP Protocols.
    b) Explain timer management in internet Transport protocol.

14. a) What is DNS? Specify the format of resource record.
    b) Explain about VOIP.

15. a) Illustrate about the steps performed by the internet super server.
    b) List and explain any two advanced socket system calls.

16. a) Explain any DES symmetric-key algorithm in detail.
    b) Explain about secure socket layer in web security.

17. Write short notes on any two.
        a) Digital signature
        b) TCP connection establishment
        c) Fragmentation

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FACULTY OF ENGINEERING
B.E. (Civil) VI – Semester (CBCS) (Backlog) Examination, October 2020

Subject: Steel Structures

Time: 2 Hours   Max. Marks: 70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1   Define plastic neutral axil and plastic moment.

2   Write briefly about the classification of cross sections.

3   Write about economical spacing of trusses.

4   Explain with sketches the edge and end distances for bolts.

5   Define shape factor and plastic modulus.

6   Show that, for economical system, the cost of trusses is equal to cost of roof coverings plus twice the cost of purlins.

7   What is the main purpose of lacing and battens?

8   What is minimum pitch distance and edge distance?

9   On what criterion the width of lacing bar depends?

10 Explain about block shear with sketch.

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 Two steel plates of size 160 x 14 mm are to be connected by lap joint with M18 bolts of grade 4.6, to resist a factored force of 250 KN. Design the joint.

12 A single angle ISA 100mm x 115 x 12 mm is connected to a 10 mm thick gusset plate at the ends with six M18 bolts of 4.6 grade in one row. Determine the design strength of angle if the gusset is connected to 150 mm leg. Use limit state method.

13 Design a simply supported beam of 7m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The total udl is made up of 100kN dead load including self-weight plus 150kN imposed load. In addition, the beam carries a point load at mid span made up of 45kN dead load and 60kN imposed load.

14 Design a suitable section for a column 3.85 m long which is effectively held in position and restrained against rotation at both ends, in order to carry a factored load of 450kN.

15 Design a base plate for a column of ISHB 200 carrying a factored load of 600kN. Assume that the column is supported on a concrete of grade M25.

16 The trusses for a factory building are spaced at 3.8m c/c and the purlins are spaced at 1.0m c/c. The pitch of truss is 1/3 and the span of the roof is 15m. The vertical load from roof sheets is 250 N/m^2 and wind load normal to roof is 1400 N/m^2. Design a channel section purlin.

17 Write short notes on the following:
    a) Block shear
    b) Theory of plastic design
    c) Explain how limit state method differed=s from working stress method.

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FACULTY OF ENGINEERING
B.E. (EEE) VI-Semester (CBCS)(Backlog) Examination, October 2019

Subject : Electrical Machinery – III

Time : 2 Hours   **Max. Marks: 70**

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1   Bring out an analogy between D.C. generator and A.C. generator.
2   What is the fictitious part of synchronous impedance and why is it so called?
3   An 8 pole A.C. generator in running at 750 rmp. What is the frequency. At what speed must the generator be run so that frequency shall be 25 HZ.
4   What is meant by load angle of alternator?
5   Explain the phenomenon of hunting in synchronous motors giving reasons.
6   State two important applications of synchronous motor.
7   An overexcited synchronous motor is called synchronous condenser. Explain.
8   Sketch the waveform of short circuit current for dead short circuit across the terminals of armature.
9   Draw the speed torque characteristics of switched relucatance motor.
10 Compare conventional D.C. motor with BLDC motor.

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 Find the synchronous impedance and reactance in an alternator in which a given field produces an Armature current of 250A on short circuit and a generated voltage of 1500V on open circuit. The armature resistance is 2Ω. Hence calculate the terminal P.D. when a load of 250A at 6000V & lagging P.F. 0.8 is switched off.

12 A 3.5 MVA slow speed 3 phase synchronous generator rated at 6.6KV has 32 poles. Its direct axis and quadrature axis synchronous reactance as measured by slip test are 9.6 Ω & 6 Ω respectively. Neglecting armature resistance, determine regulation and excitation emf needed to maintain 6.6KV at the terminals when supplying a load of 2.5MW at 0.8 p.f. lagging.

13 The input to an 11000V 3phase star connected synchronous motor is 60A. The effective resistance and synchronous reactance per phase respectively are 1Ω & 3Ω. Find
    (a) The power supplied to the motor and
    (b) Induced electromotive force for a power factor of 0.8 lag & 0.8 leading

14 Two 500KVA alternators are operating in parallel share the following loads combined
    (i)   2.50KW art 0.9 p.f.lag
    (ii) 150 KW at 0.8 p.f.lag
    (iii) 300KW at 0.75 p.f.lag
    (iv) 100KW at 0.9 p.f. lag

    One machine is supplying 400KW at 0.9 p.f.lag, calculate the power factors of the other machine.

15 Explain the construction and operation of switched reluctance motors and draw its torque-angle characteristics.

16 (a) Discuss the stability of synchronous machine connected to infinite bus bars.
   (b) Explain the operation of permanent magnet synchronous motor and list its applications.

17 A 3-phase, round-rotor synchronous generator is rated 150 MW, 0.85 power factor, 12.6kV, 60Hz, and 1800 rpm. Each winding has a line-to-neutral resistance of 1.535 Ω.
The data for the no-load magnetization curve are :

Field current (A):	200	300	400	500	600	700	800	900
Open circuit Coltage (KV):	3.8	5.8	7.8	9.8	11.3	12.6	13.5	14.2

The short circuit armature current test gives a straight line through the origin and through rated armature current at 700-A field current.
(a) Determine the unsatutrated synchronous impedance per phase.
(b) Determine the saturated synchronous impedance per phase.
(c) Draw a phasor diagram and determine the voltage regulation for the condition of rated load and 0.85 power factor lagging.
(d) Repeat part (c) rated load and 0.85 pf leading.

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FACULTY OF ENGINEERING
B. E. VI - Semester (Inst.) (CBCS)(Backlog) Examination, October 2020

Subject: Biomedical Instrumentation

Time: 2 Hours   Max. Marks: 70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1 Mention the general characteristic of Biomedical Instrument devices.

2 Mention the advantages of LVDT

3 Mention the principle of EEG.

4 Define the various heart sounds in a Phonocardiogram.

5 Draw and briefly explain the endoscopy.

6 State the Doppler principle of blood flow measurement.

7 State the principle of Image Intensifier.

8 What is the use of auto-analyzer?

9 What are the electric Hazards considered during Bio-electric monitoring.

10 What is meant by Holter monitoring?

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 (a) Describe the special features of Optical recorder with neat diagram.
    (b) Explain the need for carrier amplifier in a biomedical recording system.

12 Explain the operating principle with the block diagram of EMG Machine. Mention the design consideration of EMG amplifiers.

13 (a) Explain clearly the blood flow measurement using the electromagnetic principle.
    (b) Explain the Phonocardiography and instrumentation consisting of filters and signal conditioners.

14 (a) Write short notes on Emission photometry.
    (b) Explain in detail the working of chromatography with neat diagram.

15 Describe the electrical hazards during Bioelectric monitoring..

16 (a) What is echo cardiography? Explain in detail cine angiogram with suitable diagram.
    (b) Explain the techniques used for direct measurement of Blood pressure.

17 Write short notes on
    (a) Thermo-sensitive Recorders.
    (b) CT Scan

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FACULTY OF ENGINEERING

B.E. (ECE) VI - Semester (CBCS) (Backlog) Examination, October 2019

Subject : Digital Communication

Time : 2 hours   Max. Marks : 70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1   What are the drawbacks of Delta Modulation and discuss the remedy?
2   How Analog to Digital Conversion is performed?
3   A discrete information source with 128 equally likely symbols delivers one symbol in a millisec. Find the information rate (R).
4   Define priori and posteriori entropies.
5   Differentiate between source and channel coding.
6   Why cyclic codes are attractive than linear block codes?
7   Compare baseband and carrier modulation techniques.
8   Sketch the impulse response of a matched filter.
9   State the properties of PN sequences.
10 What are the applications of spread spectrum communication?

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 a) With necessary mathematical analysis explain delta modulation system with the help of a block diagram.
   b) Explain an application of PCM.

12 a) Perform the Shannon Fano encoding on the following source symbols.

Symbol	S0	S1	S2	S3	S4
Probability	0.25	0.1	0.3	0.15	0.2

Calculate the coding efficiency.
   b) Two Binary symmetric channels are connected in cascade. Derive the expression for channel capacity of this cascaded channel.

13 a) Design an encoder for (7, 4) binary cyclic code generated by $g(x) = 1+x+x^3$, draw the structure and verify its operation using a message vector (0111).
   b) Discuss the error detection and correction capabilities of block codes.

14 a) With the help of block diagrams explain the generation and detection of QPSK signal.
   b) Compare ASK, FSK and PSK techniques.

15 a) With a neat block diagram explain the working of Frequency Hopping Spread spectrum system.
   b) Discuss tracking of DS-SS signal using Delay Locked Loop.

16 a) An audio signal of duration 10 sec is sampled at a rate of 8KHz and encoded. The Signal to Quantization Noise ratio is required to be 40 dB. Calculate the storage capacity needed to accommodate the digitized audio signal.
   b) A discrete source emits one of five symbols once every millisecond. The symbol probabilities are 1/2, 1/4, 1/8, 1/16 and 1/16. Find the entropy of the source and information rate.

17 Write a brief note on :
   a) BCH codes
   b) M-ary signalling

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FACULTY OF ENGINEERING
B.E. (Mech.) (CBCS) VI – Semester (Backlog) Examination, October 2020

Subject: Metal Cutting & Machine Tool Engineering

Time: 2 hours   Max. Marks: 70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1. Narrate the importance of Machining process.

2. Give the comparisons between HSS and Carbide tool materials.

3. What do you mean by tool signature.

4. Mention the different types of chips and favourable conditions.

5. Mention the different types of work holding devices.

6. Give the comparisons between differential and compound indexing.

7. What are the merits and demerits of the Grinding process.

8. Differentiate drilling/boring/reaming operations.

9. Write about the applications of jigs and fixtures.

10. Mention the applications of unconventional machining processes.

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11. Explain the merchant analysis of machining forces with neat sketch and governing equations.

12. Determine the cutting, shear and frictional energies required to turn a steel work piece of shear strength 180 mpa with HSS cutting tool of 7 degree rake angle at a speed of 30met/min, 1 mm depth and 0.1mm/rev feed. Chip thickness ratio and co-efficient of friction are found to be 0.6 and 0.2 respectively.

13. Explain the details of grinding wheel specifications. Explain the working principle of centreless grinding machine with its advantages and applications.

14. Explain the different types of gear cutting procedures with neat figures.

15. Explain the special features of Capstan & Turret Lathe Machines. Differentiate the two variants.

16. Explain in detail the Electric Discharge Machining (EDM) process with neat figure. Mention the process variables and applications.

17. Write short notes of any three of the following

    (a) Orthodonal and Oblique machining

    (b) Tool-work thermo couple.

    (c) Specifications of Lathe Machine

    (d) Lapping/Honing/Buffing super finishing processes.

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FACULTY OF ENGINEERING

B.E. VI-Semester (CBCS) (Prod.) (Backlog) Examination, October 2020

Subject : Metal casting and Welding

Time : 2 hours   Max. Marks:70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1 State the elements of mould?
2 State different types of risers and their functions.
3 Why and when permanent mould vaccum casting-is preferred?
4 State four primary factors in design of investment mould casting.
5 What are slot welds?
6 State the types of fillet welds.
7 Of the metals stated twelve types of metals weld Al, brassm, Cu, Gal, Fe, fe, Monel, Nichrome, Ni, NiAg, steel, Sn plate, Zn, -which two metal do not Resistance Spot weld.
8 State four types of fusion welds.
9 State two the applications of Bakelite materials.
10 State mechanical properties of Nylon 12.

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 a) A cylinder riser is to be designed for a sand casting mold. The length of the cylinder is to be 1.23 times its diameter. The casting is a square plate, 10x10x0.75cm. if the metal is Cast Iron, and the mold constant is 16.00min/cm2 in Chvorinov's rule. Determine the dimensions of the riser so that it will take
30% longer for the riser to solidity.
   b) What is core? State the design factors of core.

12 a) A true centrifugal casting operation is to be performed in a horizontal configuration to make cast iron pipe section. The sections will have length 42cm, outside diameter 8cm and wall thickness 0.5cm. If the rotational speed of the pipe 500rev/min. determine the G-factor.
   b) Compare the advantages of semi-permanent mould over permanent mould casting.

13 a) The welding power generated in a particular arc-welding operation = 3000W. This is transferred to the work surface with a heat transfer factor = 0.9. the metal to be welded is high carbon steel whose melting point 1650 k, Assume that the melting factor =0.6. A continuous fillet weld is to be made with a cross-sectional
area =25mm2. Determine the travel speed at which the welding operation can be accomplished.
   b) Sketch the working of SMAW process-state two applications.

14 a) Sketch a Resistence Spot Weld with temperature generation.
   b) Explain the weldability criteria for the following factors i) Melting point, ii) Thermal conductivity, iii) thermal expansion, iv) surface condition, v) change in the microstructure.

………2

15 a) Discuss the procedure by sketch Testing weld by fracture Toughness test.
  b) Explain with sketch the process of transfer molding in thermosetting plastics.

16 a) A disk shaped part is to be cast out of aluminium. The diameter of the disk =500mm and its thickness =20mm. if the mold constrant =2.0sec/mm2
    in Chvorinov's rule, how long will it take the casting to solidify?
  b) A U-groove weld is used to butt weld 2 pieces of 7.0mm thick Titanium plate. The U-groove is generated using a milling cutter so the radius of the groove is 30.mm. During welding, the penetration of the weld causes and additional 1.5mm of material to be melted. The final cross-sectional area of the weld can be approximated by a semi-circle with a radius of 4.5mm. The length of weld is 200mm. the melting factor of the setup is 0.57 and the heat transfer is 0.86.   **a)** What is the quantity of heat (Joules) required to melt the volume of metal in
    this weld. **b)** What is the required heat generated at the welding source.   5

17 a) A horizontal true centrifugal casting operation will be used to make copper tubing. The length will be 1.5m with outside diameter =15cm and inside diameter   =12.5 cm. If the rotational speed of the pipe =1000 rev./min, determine the   G-factor.
  b) Explain one method of Casting inspection with neat sketch.

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FACULTY OF ENGINEERING

B.E. (A.E) VI-Semester (CBCS) (Backlog) Examination, October 2020

Subject : Design of Automotive Components

Time : 2 hours   Max. Marks:70

PART – A

Note: Answer any five questions.   **(5x2 = 10 Marks)**

1 Explain the classification of piston rings.

2 What are the design considerations of crank shaft?

3 Define the terms spring index, stress factor, spring rate, active number of coils and free length in springs.

4 What is surge in springs? How surge in springs is eliminated?

5 What is a bearing, how bearings are classified?

6 What is the relationship between L50 and L10 life?

7 What is the Lewis equation for strength of gear teeth?

8 What is Tredgold's approximation in bevel gears?

9 What are the different types pulleys used in belt drives?

10 Differentiate Hotchkiss drive and Torque tube drive.

PART – B

Note: Answer any four questions.   **(4x15 = 60 Marks)**

11   Design a connecting rod for a petrol engine from the following data: Diameter of the piston =120 mm, Mass of the reciprocating parts =2 kg, Length of the connecting rod from centre to centre =300 mm, Stroke length =140mm, Speed =2000rpm, Maximum explosion pressure =2.5 N/mm^2. The allowable stress for the materials is 340 N/mm^2.

12   Design an overhanging crankshaft for a 250 mm x 300 mm gas engine. The weight of flywheel is 30kN and the explosion pressure is 2.1 N/mm^2, when the crank angle is 35^0 from I.D.C. The connecting rod is 4.5 times the crank radius.

13   A bumper consisting of two helical steel springs of circular in cross section brings to rest, a rail wagon of mass 2000 kg is moving with a velocity of 1.3m/s, while doing so, the springs are compressed by 100mm, the mean diameter of coils is 6 times the wire diameter. The permissible shear stress is 300 MPa. Determine **a)** Max. Force on each spring **b)** wire diameter of the spring **c)** Mean diameter of coils and **d)** Number of active coils. Take G = 0.84 x 10^5 MPa.

14   A Semielliptical laminated spring is made of 5mm thick steel plate 50mm wide. The length between the supports is 665mm and the band is 65mm wide. The spring has two full length leaves and five graduated leaves. A central band of 1600N is applied. Determine.
        a) The maximum stress in each set of leaves for an initial condition of no stress in the leaves.
        b) The maximum stress if initial stress is provided to cause equal stresses when loaded.
        c) The deflection in above **(a)** and **(b).**

15   A pair of straight bevel gears consists of 24 teeth pinion meshing with a 48 teeth gear. The module at the outside diameter is 6mm, while face width is 50mm, the gears are made of grey cast iron from FG220 (Sut =220N/mm^2), pressure angle is 20^0. The teeth's are generated and assumed that the velocity factor accounts for the dynamic load. The pinion rotates at 300 rpm and the service factor is 1.5, calculate **i)** The beam strength of the tooth, **ii)** The static load that the gears can, transmit with a factor of safety of 2 for bending consideration and **iii)** Rated
        power that the gears can transmits.

16   A worm drive transmits 15 kW at 1200 r.p.m. to a machine carriage at 80 r.p.m. The worm is triple threaded and has 75 mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to be 20^0 full depth involute. The coefficient of friction between the mating teeth may be taken as 0.10. Calculate: **i)** Tangential force acting on the worm; **ii)** Axial thrust and separating force
        on worm; and **iii)** Efficiency of the worm drive.

17   Write short note on
    a) Design Consideration of Piston.
    b) Two-Speed Final Drive.
    c) Limited Slip Differentials

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FACULTY OF ENGINEERING

BE VI-Semester (CBCS) (CSE) (Backlog) Examination, October 2020

Subject : Design and Analysis of Algorithms
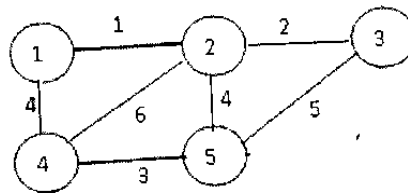
Time: 2 Hours **Max. Marks: 70**

PART – A

Note: Answer any five questions. **(5x2 = 10 Marks)**

1. Solve : $T(n) = 2T\left(\dfrac{n}{2}\right) + c$

2. Explain set representation and write algorithm for 'FIND'

3. Define minimum spanning tree. Draw the spanning tree of the given graph

4. What is Hamiltonian cycle? How is it different from the tour of travelling salesperson problem?

5. What is multistage graph and write the recurrence relations for solving shortest path in multistage graph using dynamic programming.

1. Differentiate between Backtracking and Branch and Bound approaches

2. State Cook's theorem. Explain its significance in NP – complete theory

3. Solve the fractional knapsack problem: Profits are, (p1, p2…. P5) = (20, 30, 66, 40, 60) and Weights are w1, w2,. W5) = (10, 20, 30, 40, 50) The knapsack capacity is 100.

4. Explain what are explicit and implicit constraints of 8-Queens problem?

5. What is lower bound theory

PART – B

Note: Answer any four questions. **(4x15 = 60 Marks)**

11. a) Define Big Oh and Big Omega notations of time complexity analysis. Express Big Oh and Big Omega for the following algorithm

```
Algorithm search (a, k)
//a : array of n elements
//k : element to be searched in the array
{      for I : = 1 to n do
{           if (a [i] ==k)
                  return k;   }
       return – 1;     }
```

b) Write an algorithm to form a heap using 'Heapify' and discuss about its time complexity. 5

12. Write an algorithm for quick sort and derive the best case and worst case time complexities

…2

13. Write recurrence relations for solving OBST using dynamic programming and construct the tree for given data :
n =4, (a1, a2, a3, a4) = (end , goto, print, stop)
p (1:4) = (4,2,1,1)   q(0:4) = (2, 3, 1, 1, 1)

14. Explain solution to Graph coloring problem using Backtracking

15. a. Discuss P, NP class of problems. Write non deterministic algorithm for sorting
    b. Discuss any two NP-Hard graph problems

16. Single source shortest path : Use Algorithm Shortest Paths to obtain in non-decreasing order the lengths of the shortest paths from vertex 1 to all remaining vertices
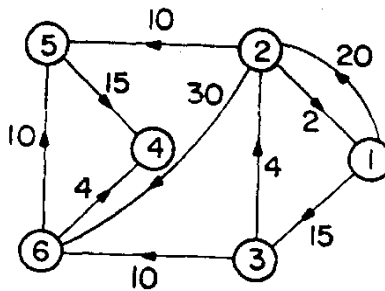
17. Write short notes on :
    a. Reliability Design
    b. 0/1 knapsack using LCBB

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FACULTY OF ENGINEERING
B.E. (I.T.) VI-Semester (CBCS)(Backlog) Examination, October 2020

Subject : Design and Analysis of Algorithms

Time : 2 Hours   Max. Marks: 70

PART – A

Note: Answer any five questions.   (5x2 = 10 Marks)

1 Write an Algorithm to insert an element into a Heap?
2 Define Asymptotic Notations Omega and Theta?
3 Write the control abstraction for Divide and Conquer technique.
4 Find an optimal binary merge pattern for files whose
    number of records are 2, 5, 7, 9, 12, 13, 15
5 Define Optimal binary search tree with an example.
6 Explain Reliability Design problem
7 State the methodology of Branch and Bound.
8 What is Hamiltonian cycle? How is it different from the tour of traveling sales
    person problem?
9 Explain P and NP Classes?
10 Write a Nondeterministic knapsack algorithm.

PART – B

Note: Answer any four questions.   (4x15 = 60 Marks)

11 (a) Give the algorithm for matrix multiplication and find the time complexity
        of the algorithm using step – count method.?
    (b) Solve the following instance of 0/1 Knapsack problem using
        Dynamic programming n = 3; (W1, W2, W3) = (3, 5, 7);
                (P1, P2, P3) = (3, 7, 12); M = 4.

12 (a) Write FIND and UNION Algorithms.
    (b) Write a recursive algorithm for finding both the minimum and maximum
        Elements in an array A of n elements.

13 Apply Floyd's Warshall Algorithm to find the All-Pairs shortest paths for the
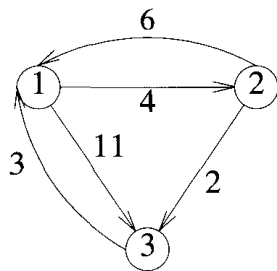   Graph shown in figure 1.

Fig.1

14 Solve the 8-Queen's Problem Using Backtracking?

15 (a) State Cook's theorem. Explain its significance in NP-complete theory.
    (b) Explain Node Cover Decision problem.

16 (a) Sort the Numbers using Quick sort 30 40 50 10 20. Show each Step?
    (b) Explain Lower Bound Theory

17 Write Short notes on the following
    (a) Multistage Graphs
    (b) Greedy Approach

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